

## Description

# *[AUTOMOTIVE SEAT ASSEMBLY WITH IMPROVED SIDE IMPACT RIGIDITY]*

### BACKGROUND OF INVENTION

[0001] The present invention relates generally to an automotive seat assembly and more particularly to seat assembly for contributing to increase side-impact rigidity.

[0002] Automotive side-impact protection is a significant field in automotive design. Automobile side impact protection often includes mandated parameters in accordance with federal requirements. The National Highway Traffic Safety Administration additionally has begun performing a higher velocity Lateral Impact New Car Assessment Program (LINCAP) test, using a moving deformable barrier (MDB) to arrive at a performance rating for each vehicle. The importance of positive performance on such testing, in addition to customer safety and satisfaction, places automotive side impact protection as an important design consideration.

[0003] It is apparent that during many simulations, the MDB generates interaction with the rocker panel of the struck vehicle. Common MDBs create a simulated vehicle to strike the test impact vehicle. Newer MDBs used to simulate SUVs and pickup trucks (such as the Insurance Institute for Highway Safety testing (IIHS)) have been found to generate further interaction with the rocker panel of the struck vehicle. In fact, the higher ground clearance and mass of these new MDBs, when striking a test passenger vehicle, has been found to override the rocker panel and generate additional side impact intrusion. This is clearly undesirable.

[0004] The lateral strength of vehicle seats positioned within the struck vehicle play a role in side-impact test ratings. Vehicle crash comparisons demonstrate that a seat that is stronger in lateral compression may improve the LINCAP and other side-impact test ratings. Lateral seat strength may play an even more important role in the IIHS testing as the IIHS MDB typically contacts the struck vehicle in an even higher location than the federal requirements test.

[0005] It would, therefore, be highly desirable to have an automotive design with improved side impact rigidity to resist intrusion during side impact. It would further be highly

desirable to have an automotive seat assembly that contributed toward prevention of rocker override and side-impact intrusions.

#### **SUMMARY OF INVENTION**

[0006] It is, therefore, an object of the present invention to provide an automotive seat assembly with improved side-impact rigidity. It is a further object of the present invention to provide an automotive seat assembly with improved resistance to rocker override and side impact intrusions.

[0007] In accordance with the objects of the present invention, an automotive seat assembly with improved side impact rigidity is provided. The seat assembly includes a seat frame. The seat frame includes a frame track, a frame base slidably engaged to the frame track, and a frame back rotatably engaged to the frame base. A rear lateral support assembly includes a support frame attached to a rear portion of the frame base such that the support frame is movable in concert with the frame base. The support frame defines a pocket portion. A tubular member is positioned within the pocket portion. A rocker panel end cap assembly secures a first end of the tubular member within the pocket portion. The rocker panel end cap posi-

tioned to engage a rocker panel during side impact. A tunnel console end cap assembly secures a second end of the tubular member within the pocket portion. The tunnel console end cap assembly is positioned to engage a tunnel console such that the tubular member generates a rigid support between the rocker panel and the tunnel console.

[0008] Other objects and features of the present invention will become apparent when viewed in light of the detailed description of the preferred embodiment when taken in conjunction with the attached drawings and appended claims.

#### **BRIEF DESCRIPTION OF DRAWINGS**

[0009] FIGURE 1 is an illustration of an automotive seat assembly in accordance with the present invention.

[0010] FIGURE 2 is an exploded illustration of the automotive seat assembly illustrated in Figure 1.

[0011] FIGURE 3 is a detailed exploded illustration of a rear lateral support assembly for use in the automotive seat assembly illustrated in Figure 1.

[0012] FIGURE 4 is an illustration of the automotive seat assembly illustrated in Figure 1, the seat illustrated mounted within an automobile prior to side-impact.

[0013] FIGURE 5 is an illustration of the automotive seat assem-

bly illustrated in Figure 1, the seat illustrated mounted within an automobile post side-impact.

#### **DETAILED DESCRIPTION**

[0014] The present invention provides an improved automotive seat assembly 10 for improved resistance to side-impact collisions. The seat assembly 10 preferably includes a seat frame assembly 12 mounted to the floor pan 14 of an automobile 16 (see Figure 5). The seat frame assembly 12 is comprised of a frame track 18 for mounting directly to the floor pan 14 or similar automotive structure, a frame base 20 slidably engaged to the frame track 18 for providing a range of seating positions, and a frame back 22 rotatably engaged to the frame base 20. Such is the basis construction of the seat frame assembly 12.

[0015] The present invention, however, goes on to provide an improved rigidity to side impact by including a rear lateral support assembly 24 mountable to a rear portion 25 of the frame base 20. Although the rear lateral support assembly 24 may be affixed in a variety of fashions, it is preferably bolted to the frame base 20 to allow retrofit and ease of assembly. By attachment to the frame base 20, the rear lateral support assembly 24 can move in concert with the frame base 20 and therefore does not inter-

fere with the variety of seating positions normally achieved through the use of a frame base.

[0016] The rear lateral support assembly 24 is comprised of a support frame 26 extending the width of the frame base 20. The support frame 26 directly mounts to the frame base 20 such that it moves in concert in a fore/aft fashion with the frame base 20. The support frame 26 defines a pocket portion 28 that may includes a forward extended pocket portion 30. A tubular member 32 spans the length of the support frame 26 and is positioned within the pocket portion 26. When a forward extended pocket portion 30 is utilized, a foreword extended tubular portion 34 is preferably utilized on the tubular member 32. A rocker panel end cap assembly 36 secures the first end 38 of the tubular member 32 to the support frame 26. The rocker panel end cap assembly 36 preferably includes a rocker panel end cap 40 and a c-section triangular brace 42. The rocker panel end cap 40 is preferably an elongated end cap to increase the rocker panel impact area 44. The second end 46 of the tubular member 32 is secured to the support frame 26 through the use of a tunnel console end cap assembly 48. This preferably includes a tunnel end cap 50 and a tunnel hook brace 52. The tunnel end cap 50

preferably generates an elongated end cap to increase the tunnel console impact area 54.

[0017] The rear lateral support assembly 24 is mounted on the frame base 20 such that the rocker panel end cap assembly 36 is positioned to engage a vehicle rocker panel 56 during impact. Similarly, the tunnel console end cap assembly 48 is similarly positioned to engage a vehicle tunnel console 58 during impact (see Figures 4 and 5). This generates a rigid support between the rocker panel 56 and the tunnel console 58 during side impact that provides additional rigidity and strength to the vehicle. This is accomplished without restricting seat positioning adjustments. In addition, it is contemplated that the support frame 26 may be rotationally mounted to the frame base 20 such that if the frame base 20 is vertically adjusted, the support frame 26 and tubular member 32 may rotate relative to the end cap assemblies 36,48 to keep the rear lateral support assembly 24 out of the way of other seating elements while keeping the end cap assemblies 36,48 in position to properly engage the rocker panel 56 and tunnel console 58 during side impact.

[0018] The present invention may further includes an upper section cross brace 60 preferably welded between a frame

back rocker side 62 and a frame back tunnel side 64 as shown in Figure 2. This provides lateral support to the vehicle frame back 22 during collision. A midsection brace 66 may additionally be utilized to further increase seat rigidity. Although a variety of midsection braces 66 may be utilized, one embodiment contemplates the use of a horizontal c-section brace portion 68 mounted, preferably welded, in a lower portion of the frame back 22 between the frame back rocker side 62 and the frame back tunnel side 64. Additionally a vertical brace portion 70 mounted to the frame back rocker side 62 provides additional strength and passenger protection. The vertical brace portion preferably includes a vertical c-section portion 72 in conjunction with a vertical triangular brace portion 74. The vertical triangular brace portion 74 is preferably welded to the horizontal c-section brace portion 68 to generate both lateral and bending resistance to the frame back 22. The vertical brace portion 70 and the horizontal c-section brace portion 68 act in concert to form a horizontal lower brace. This adds more resistance to intrusion during side impact collisions.

[0019] While particular embodiments of the invention have been shown and described, numerous variations and alternative



embodiments will occur to those skilled in the art. Accordingly, it is intended that the invention be limited only in terms of the appended claims.